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PATENT AND TECHNICAL TRANSLATION

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DECLARATION

The undersigned, Olaf Bexhoeft, hereby states that he is well acquainted with both the English and German languages and that the attached is a true translation to the best of his knowledge and ability of the German text of PCT/EP2005/051163, filed 03/15/2005, and published on 10/06/2005 as WO 2005/092629.

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.



Olaf Bexhoeft

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Specification

Method for Identifying a Single Panel Comprising a Printed Image of Defective Quality on Printed Material Comprising Several Panels

The invention relates to methods for identifying a single proof copy containing a printed image of defective quality on imprinted material comprising several proof copies in accordance with the preamble of claims 1 or 11.

A printing press, in particular a sheet-fed offset printing press, is known from DE 200 10 920 U1 and EP 1 167 036 A1, in which, for determining the quality of a printed image arranged on the imprinted material, an image registration device registers the imprinted material, and an evaluation device connected with the image registration device compares the image of the imprinted material registered by the image registration device with a reference image, wherein the imprinted material is covered with a plurality of identical printed images, and the evaluation device only evaluates a part of the printed images on the image of the imprinted material wherein, in case of an agreement of the evaluated partial amount with the reference image issues a signal to a counting device for registering the partial amount.

A method for identifying a single proof copy containing a printed image of defective quality on an imprinted material containing several proof copies is known from DE 44 32 371 A1, wherein an inspection system takes a picture of the imprinted material with a camera and processes data from the picture taken in an image processing system, wherein the image processing system compares the data from the picture taken with a single proof copy in the data set relating to the imprinted material.

It is known from the technical article by Dieter Kleeberg "The Linked Printing Plant" in the supplement to the company publication KBA Report No. 14 of Koenig & Bauer AG, Würzburg, 2000, pp. 4, 6, 7, to combine positional data for further processing, and data for inline quality control into a data set by means of a uniform data file (CIP3-PPF-data files). By means of proceeding in this way it is only necessary to compile a data set once for the identification of individual error-containing proof copies and for further processing.

An image inspection system for a printing press is known from DE 203 03 574 U1, wherein the imprinted material which was imprinted with proof copies is recorded by an image recording system and the image signals obtained are processed in a downstream-connected image processing arrangement, wherein a printing device which can be controlled in accordance with the image signals is arranged downstream of the image recording system, by means of which markings for identifying areas determined to be in error can be created at predetermined locations of the imprinted material, as a result of which misprinted proof copies can be removed in an appropriately embodied further processing device.

A method for determining the position and/or shape of at least one marker on a web to be imprinted is known from the later published EP 1 403 045 A2, wherein the position and/or shape of the at least one marker in the image to be printed is determined by the use of pre-press data.

The object of the invention is based on creating methods for identifying a single proof copy containing a printed image of defective quality on an imprinted material containing several proof copies, wherein the identification of the proof copy with

the image of defective quality takes place without the aid of a printed reference imprinted material and wherein an efficient production run results for the identification of individual defective proof copies and for the establishment of a data set for performing this identification.

In accordance with the invention, this object is attained by means of the characteristics of claims 1 or 11.

The advantages to be gained by means of the invention rest in particular in that an imprinted material, in particular a sheet, printed by a printing press containing several proof copies need not be treated as waste material if a single proof copy of the imprinted material has a printed image of defective quality. The proof copy of the imprinted material with a printed image of defective quality can be separated in a process step following the printing process, so that all other proof copies with a printed image of good quality can be used for the intended purpose. A single proof copy of the imprinted material with a printed image of defective quality can be unequivocally identified. It is quite advantageous that every one of the proposed methods is suitable to identify individual proof copies of any arbitrary shape and any arbitrary orientation on the imprinted material. A set-up phase of the printing press remains unaffected by the method for the identification of a single proof copy of the imprinted material with a printed image of defective quality, so that no additional process step is required in the course of the set-up phase of the printing press which, for example, could consist in the evaluation of a set-up sheet which would have to be specially prepared.

Exemplary embodiments of the invention are represented in the drawings and will be described in greater detail in what follows.

Shown are in:

Fig. 1, a schematic representation of an inspection system,
Fig. 2, a sheet with several proof copies.

In accordance with its schematic representation in Fig. 1, an inspection system particularly suited for a printed image check has a camera 01, for example one or several color line cameras 01 connected to each other or a color area camera 01, which takes a picture of an image, illuminated by an illumination arrangement 02, of an imprinted material 03, preferably embodied as a sheet 03, after the imprinted material 03, for example made of paper, has been imprinted with at least one printed image in a printing press, for example a rotary printing press, in particular a sheet-fed rotary offset printing press. The imprinted material is preferably imprinted in multi-color print in the course of its passage through the printing press, so that several color separations, each one differing in the respectively used printing ink which varies in color, which are to be printed on top of each other, are involved in the production of the printed product.

The image taken by the camera 01 reproduces at least a portion of the imprinted material 03. Data determined by the camera 01 from the picture taken which, for example, correlate with amplitude values of individual color channels, are processed in an image processing system 04. The output of the results takes place, for example, on a monitor 06, which is connected with the image processing system 04 which processes the data. Inputs, for example parameters, necessary to be provided to the image processing system 04 for its calculations, are input through a keyboard 07 connected to the image processing system 04.

The imprinted material 03, in this case the sheet 03 for example, is imprinted with proof copies on its passage through the

printing press and has in accordance with Fig. 2 several individual proof copies 09 connected with each other. The individual proof copies 09 can be repeated, but for example can also be identical print subjects, which are preferably arranged structured, for example in a grid shape, i.e. in rows and columns, on the sheet 03, wherein in the preferred embodiment the proof copies 09 arranged on the sheet 03 do not necessarily have to cover the entire area of the sheet 03 which could be imprinted. However, for executing the proposed methods there is no necessity for the proof copies 09 arranged on the sheet 03 to be identical in their contours, or for the respective contour to be substantially rectangular, or for the proof copies 09 arranged on the sheet 03 to be seamlessly touching, or for the proof copies 09 arranged on the sheet 03 to be arranged in a regular structure, i.e. in a grid with a fixed orientation.

If several proof copies 09 of any arbitrary form, i.e. any arbitrary shape, and also with any arbitrary orientation, are arranged on the sheet 03, at least one area 11, for example an edge 11, results on the sheet 03, in which an error which reduces the quality of the printed image, in particular as a result of printing, does not have a disadvantageous effect, because this area 11, or edge 11, is removed in a process step following printing, in which the imprinted sheet 03 is further processed. For this reason the image of the sheet 03, which was photographically taken by the color line camera 01 or the color area camera 01, is preferably only evaluated in view of the proof copies 09 arranged on the sheet 03, so that the area 11 or edge 11 on the sheet 03 which is located outside the proof copies 09, is not evaluated in regard to errors which would reduce the quality of the printed image.

The selective evaluation of the sheet 03 in regard to at least one error, which reduces the quality of the printed image, for example an error in color, smudging or any other error inflicted on the sheet 03 prior to, or in particular during the printing process, takes place in such a way that it is determined to which of the proof copies 09 arranged on the sheet 03 the error detected by the color line camera 01 or the color area camera 01 is to be assigned. For this purpose information regarding the location of the detected error in respect to the area specified on the sheet 03, in particular its imprinted area, is preferably initially provided to the image processing system 04 by means of an appropriate evaluation of the data correlated with the recorded image, so that for example the coordinates of the error which reduces the quality of the printed image are localized, and then that particular proof copy 09 among the proof copies 09 imprinted on the sheet 03 is identified, within whose contours the location of the detected error lies.

An individual proof copy 09 is identified in that the image processing system 04 places a template, so to speak, over the image taken by the color line camera 01 or the color area camera 01 of the sheet 03 in the course of its data-processing steps, wherein the template consists of an electronically generated data set and wherein this data set is not taken from a photographically obtained image, and in particular is not obtained within the printing press, but instead is taken from data stored in a pre-print stage. For example, the data set constituting the template is generated by a CAD system (computer-aided design) and is provided to a memory, for example in the pre-print stage, wherein this data set contains information regarding the position, shape, or size, for example diameter, of the individual proof copies 09

arranged on the sheet 03, or wherein this information can at least be obtained from the data set. Instead of relating to an absolute position, the information can also relate to the arrangement of the individual proof copies and in this way provide information regarding the position of an individual proof copy 09 in relation to one or several other proof copies 09. The shape of a proof copy 09 identifies its type or kind, for example circle, rectangle or another arbitrary geometric shape. In connection with the preferred embodiment, the data set is generated in connection with the making of a punch matrix for separating proof copies 09 from the sheet 03, and is sent to the image processing system 04. This step is advantageous because recourse is had to a data set which is present anyway, so that an additional outlay for generating this data set does not occur. If, on the sheet 03 with the totality of all proof copies 09 arranged there, an individual proof copy 09 of a form or shape is arranged, which preferably significantly differs from the other proof copies 09, in the course of detecting an error which reduces the quality of the printed image it is possible to draw immediate conclusions regarding the location of the error in respect to this different proof copy 09, because this different proof copy 09 has a fixed relationship with the other proof copies 09 arranged on the sheet 03.

A firm relationship between an error detected by the color line camera 01 or the color area camera 01 and a proof copy 09 on the sheet 03 can be established by means of the data set constituting the template in that the information regarding the arrangement, form or size of the individual proof copies 03 arranged on the sheet 03 is superimposed on the data of the image taken by the color line camera 01 or the color area camera 01, or

on at least the information regarding the location of the detected error for the purpose of a comparison. By means of a comparison of the information regarding the detected location of the error with the information regarding the arrangement, form or size of the individual proof copies 03 arranged on the sheet 03, with the aid of the data set constituting the template it is now possible for the image processing system 04, for example, to unequivocally determine with which one of the proof copies 09 arranged on the sheet 03 an error detected and localized on the sheet 03 is associated.

A proof copy 09, which has been identified as having an error detected by the color line camera 01 or the color area camera 01 can be marked, for example by a marking device 08 controlled by the image processing system 04, by means of the application of a number or other marking, for example, or can be displayed on the monitor 06, so that the marking of the respective proof copy 09 containing a printed image of defective quality can also be performed by the operators of the printing press, for example.

The proof copy 09 identified on the sheet 03, within whose contours the error detected by the color line camera 01 or the color area camera 01 is located, can be separated from the remaining proof copies 09 in the course of a processing step following the actual printing process in that the proof copies 09 arranged on the sheet 03 are punched out, for example by means of a punching tool, and the proof copy 09 which has the detected error and has preferably been marked is extracted, for example by being shunted off. As a result all of the proof copies 09 arranged on the sheet 03, with the exception of the marked proof copy 09, can be used for the intended purpose, which is advantageous in

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particular in connection with high quality printed products.

List of Reference Numerals

01	Camera, color line camera, color area camera
02	Illumination arrangement
03	Imprinted material, sheet
04	Image processing system
05	-
06	Monitor
07	Keyboard
08	Marking device
09	Proof copy
10	-
11	Area, edge